Appalachian State University

Department of
Sustainable Technology &
the Built Environment

Team
BIGapp

Division
Suburban Single-Family

Project Presentation
2021-04-13

the NEW house team 2

Net-zero Energy Workforce
affordable access housing
for northwestern North Carolina

filter house

YANCEY COUNTY
ECONOMIC DEVELOPMENT COMMISSION

Mitchell-Yancey Habitat for Humanity®

U.S. DEPARTMENT OF ENERGY
SOLAR DECATHLON

Integrated **Team**

Project Support

Andrew WINDHAM, PhD	Faculty Advisor
Reza FOROUGHI, PhD	Faculty Advisor
Jason MILLER, MArch	Faculty Advisor
Zach HOFFMAN	Consulting Architect Partner, in situ studio
Paul DRACE	Building Industry Specialist, SmartLam


Architectural Technology and Design

Jori DURHAM	Lead Architectural Designer
Sara TAYLOR	Architectural Designer

Construction Management

Matthew COOK	Assistant Estimator
Kyle GROGAN	Cost Analyzer
John MEDFORD	Assistant Estimator
Denton CLARK	Lead Construction Manager
Kacie BECK	Construction Management Assistant

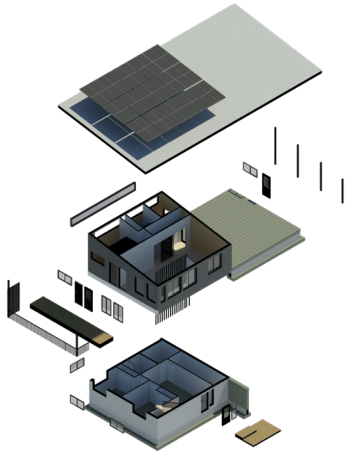




Sustainable Building Systems

Emily MALINOWSKI	Lead Building Systems Specialist

the **NEW House**



Project **Summary**

the NEW house: FILTER house

Project Data

Client	the WILLIAMS family
Location	Burnsville, NC, USA
Climate zone	5a
Lot info	Glendale 082009251369000
Building size	1933 csf
Program	3 bed / 2 bath
HERS score	0 w PV / 50 wo PV
Utility costs	$66.73 per month
Construction	$108 per sf

Technical Specifications

Assembly	Cross Laminated Timber (CLT)
R-Values	13 F / 24 W / 27 R
HVAC ID req tons]	MZ-HM18NA [1.56 PV
Offsite	DOE PV Ready /

Project Highlights

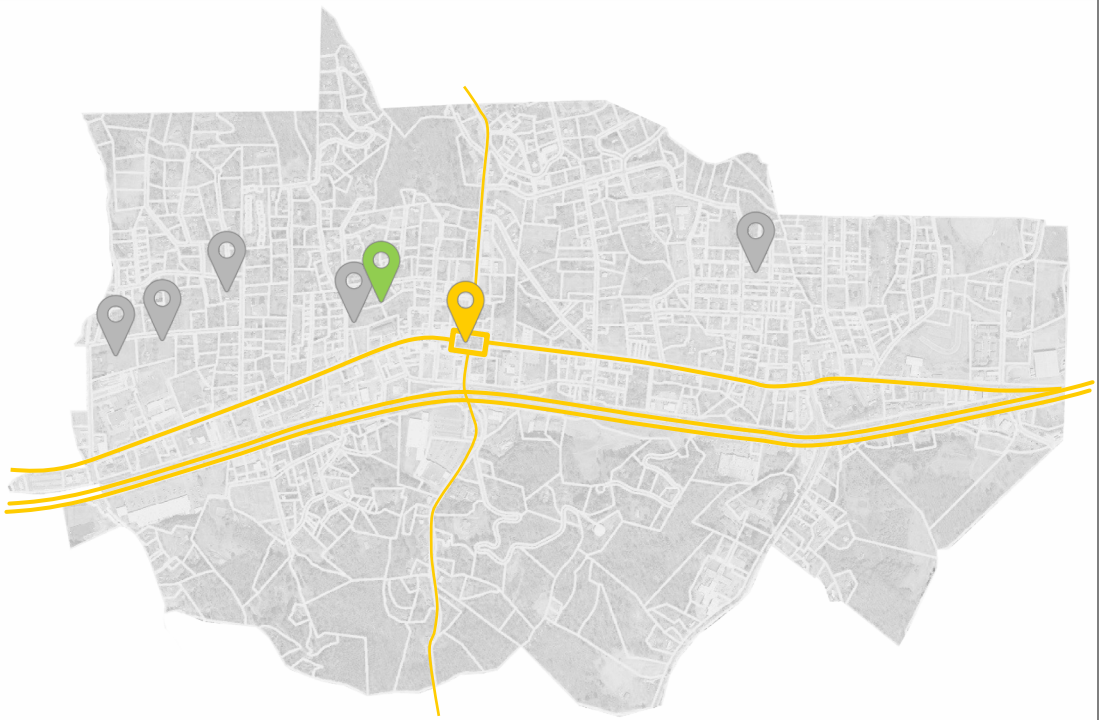
The filter house uses compact public space that extends to outdoor living space to maximize the usable space for the Williams family. These exterior

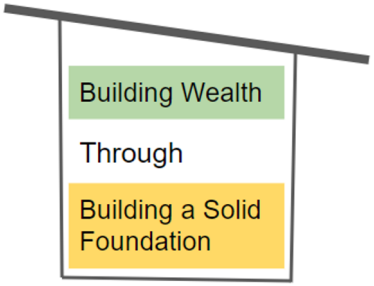
Meet the Williams

A family of four relocating from South Carolina to Burnsville, NC, to become part of the local community workforce. A combined annual income of $60,000 makes it difficult for them to access affordable housing options in Yancey County.

Constraints **& Goals**

Affordability

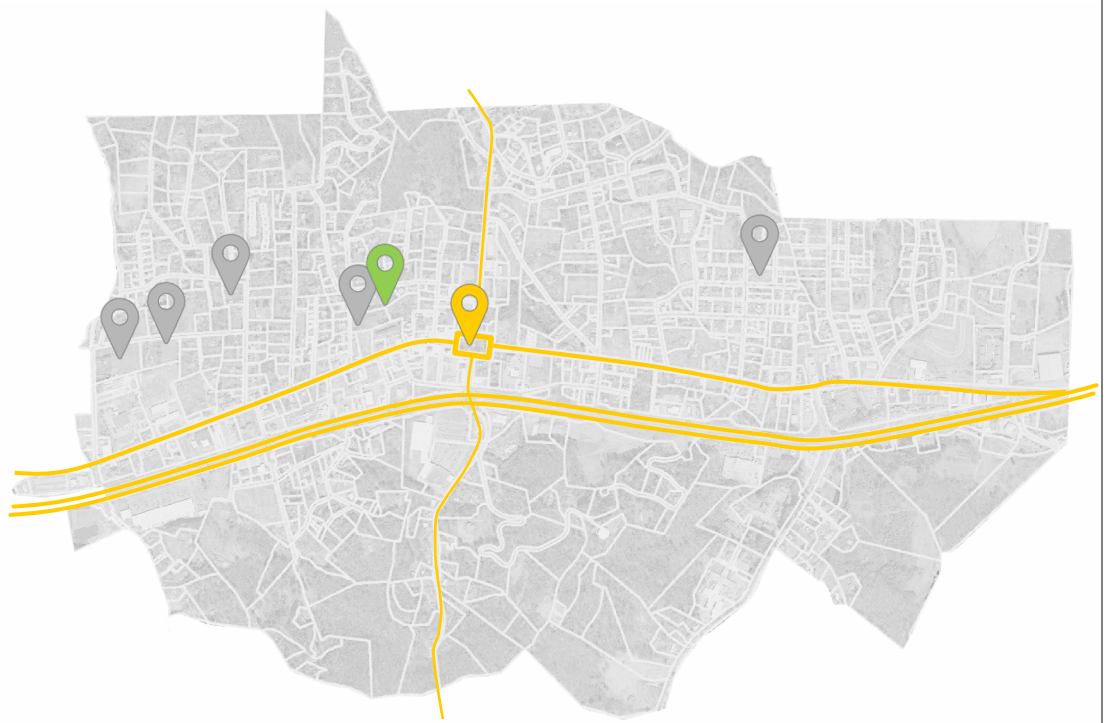




Constraints **& Goals**

Affordability

Community

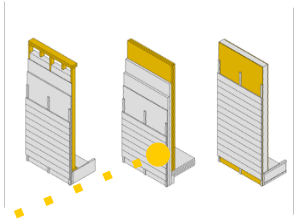


Constraints **& Goals**

Affordability

Community

Constructability



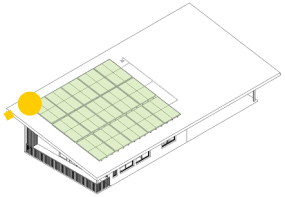
Constraints
& Goals

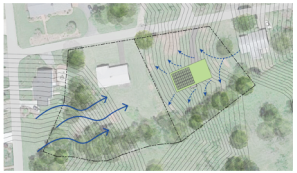
Affordability

Community

Constructability

Net Zero Energy

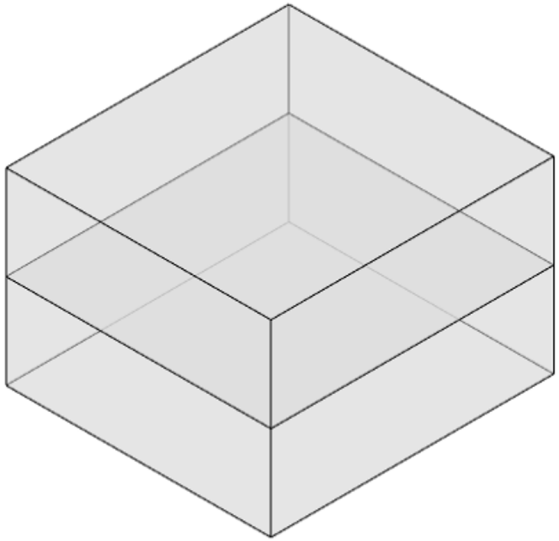


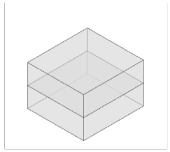


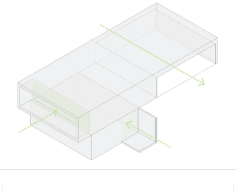
1 Architecture

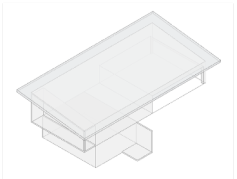
Design Concept
This **NEW** house acts as a filter for the Williams family.

Stack



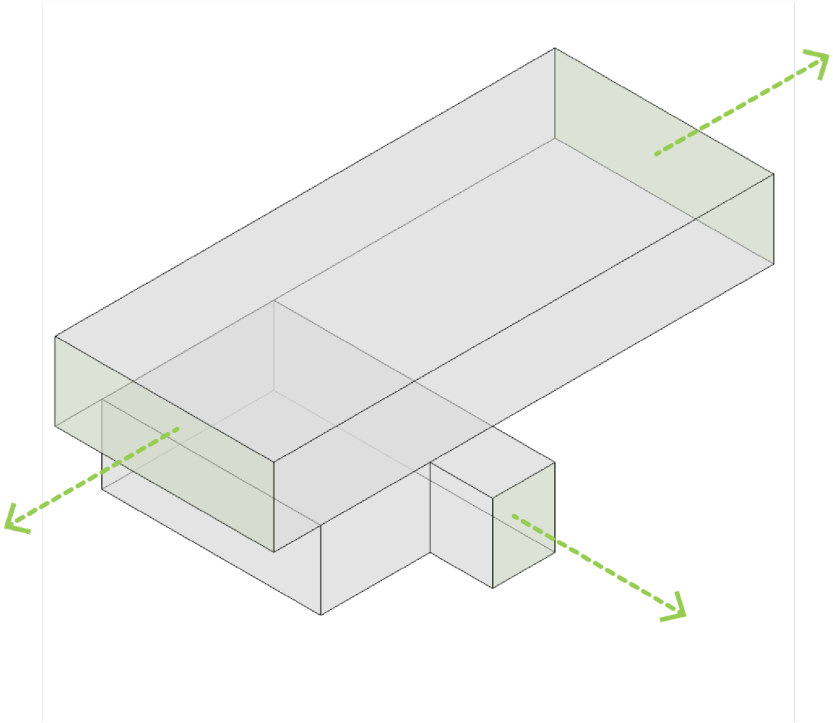


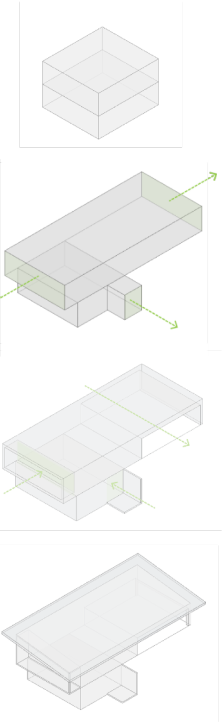




Stack

Stretch

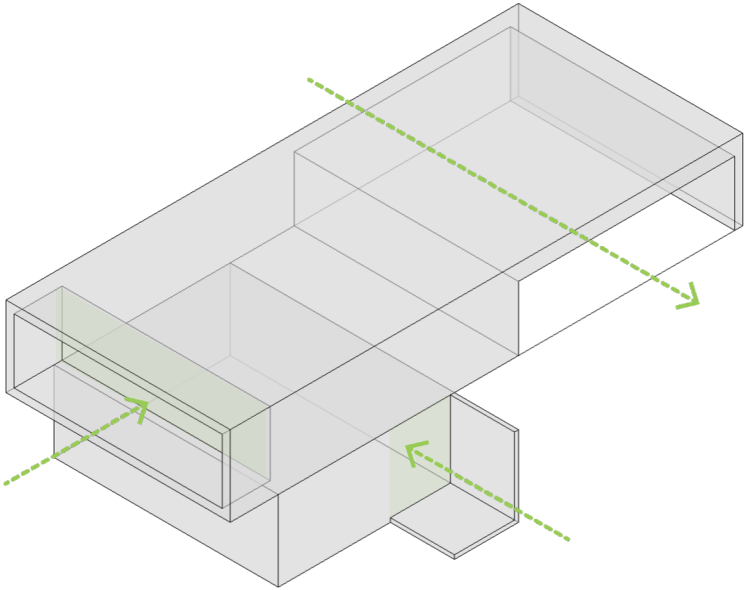


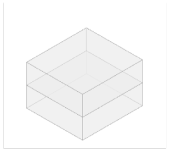


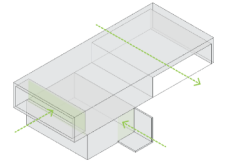
Stack

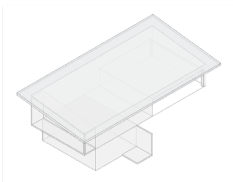
Stretch

Subtract







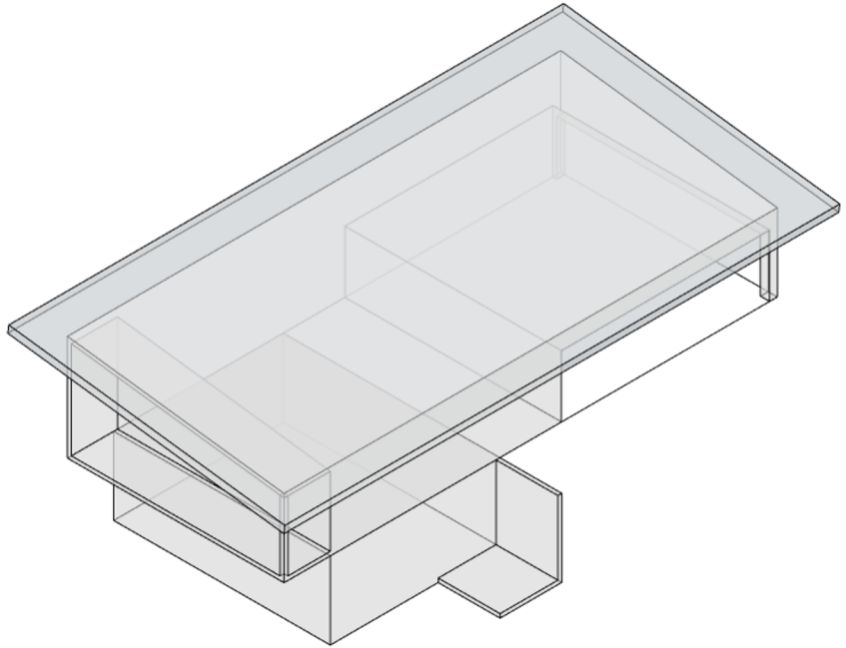


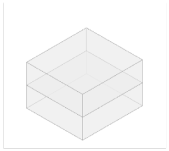
Stack

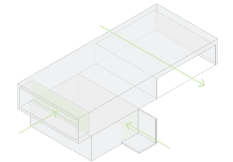
Stretch

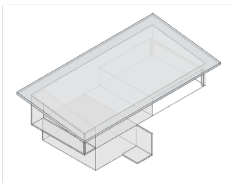
Subtract

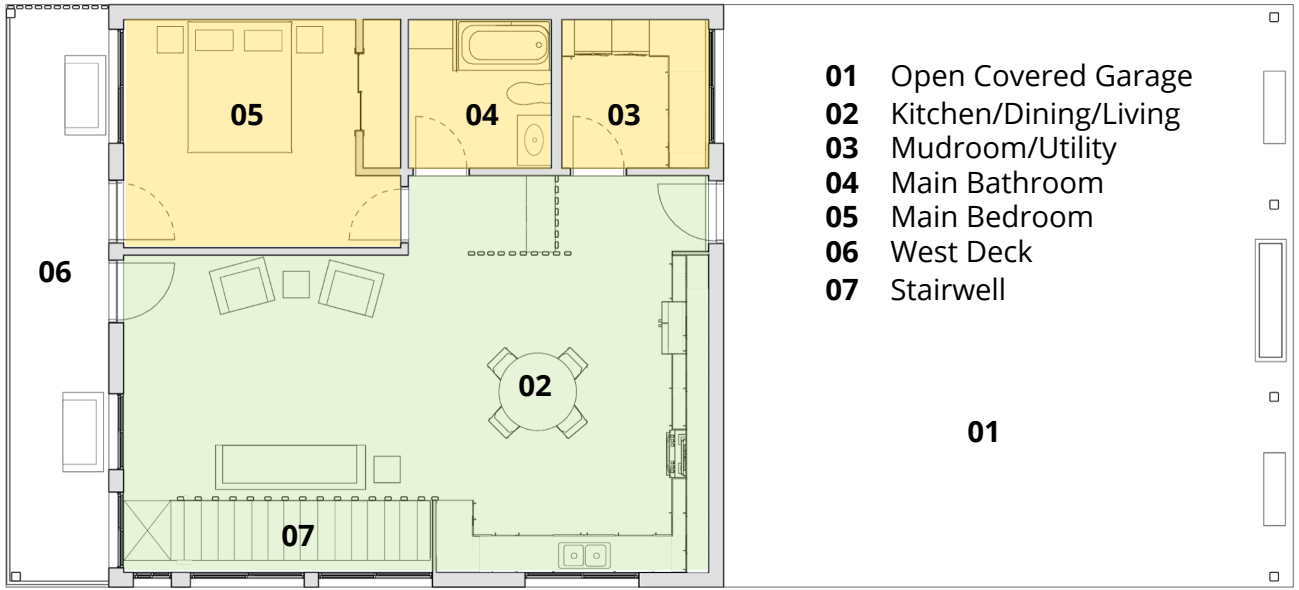
Slope







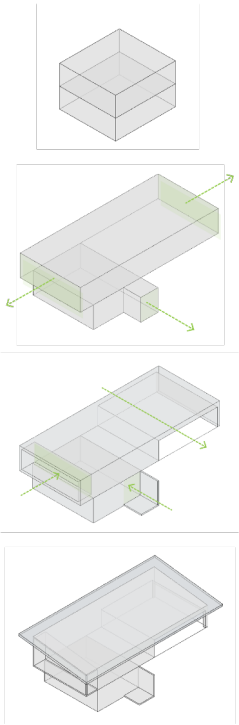


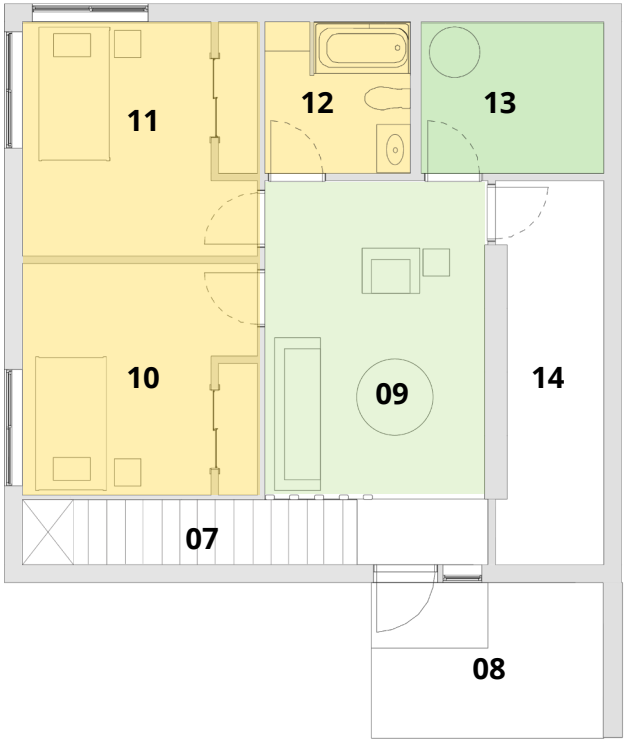


01 Open Covered Garage
02 Kitchen/Dining/Living
03 Mudroom/Utility
04 Main Bathroom
05 Main Bedroom
06 West Deck
07 Stairwell

Main Level

0 2 4 8

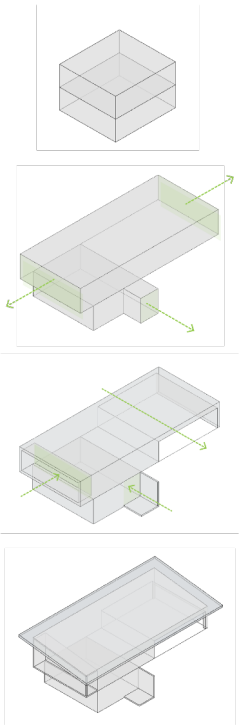




07 Stairwell
08 South Porch
09 Den
10 Bedroom
11 Bedroom
12 Bathroom
13 Mechanical
14 Unconditioned Storage

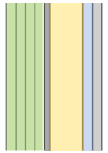
Lower Level

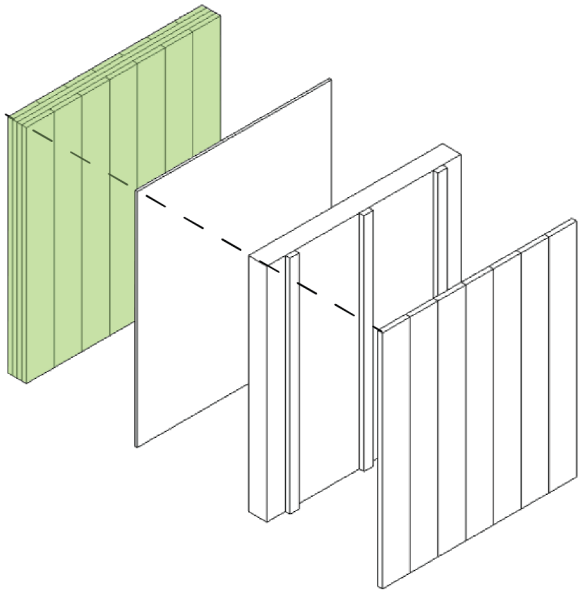
0 2 4 8

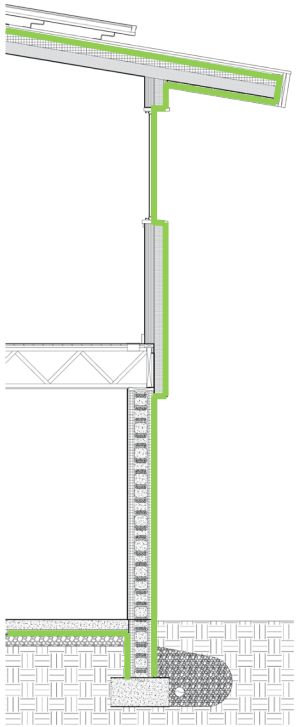


2
Engineering

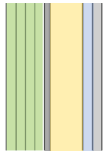
Structure

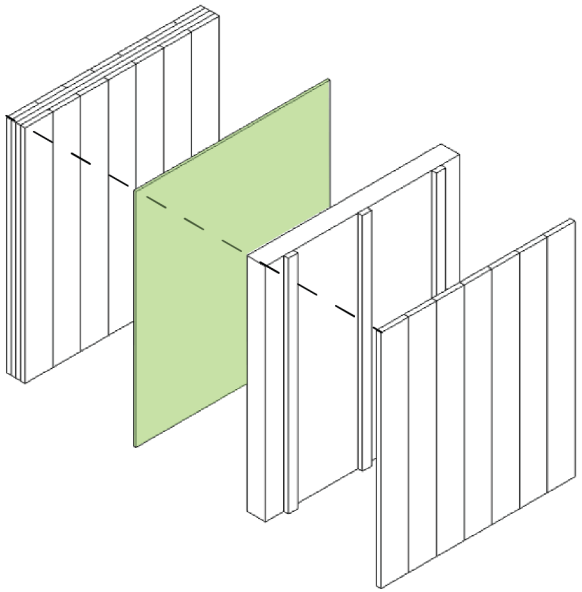


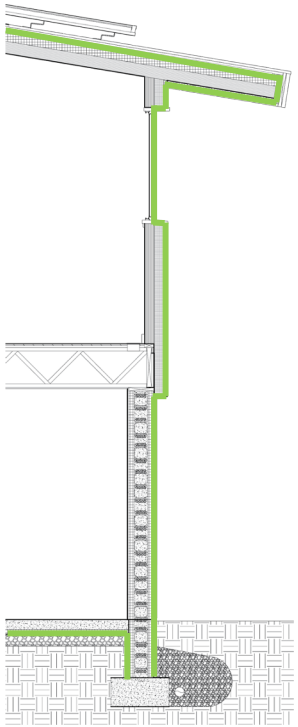




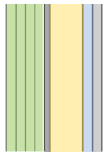
Structure
Control Layers

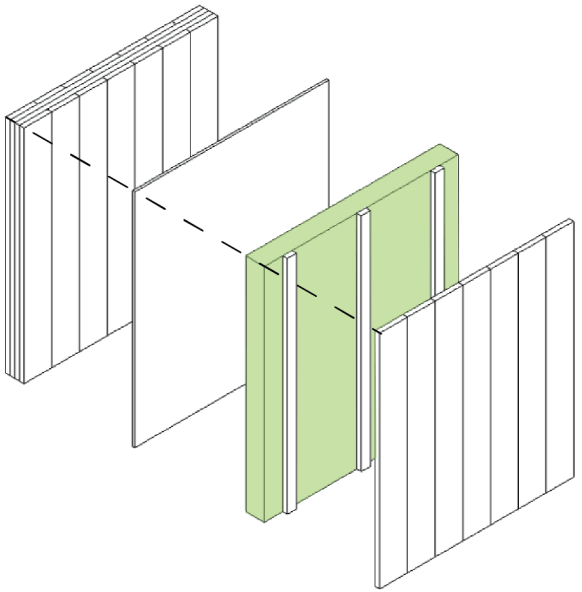


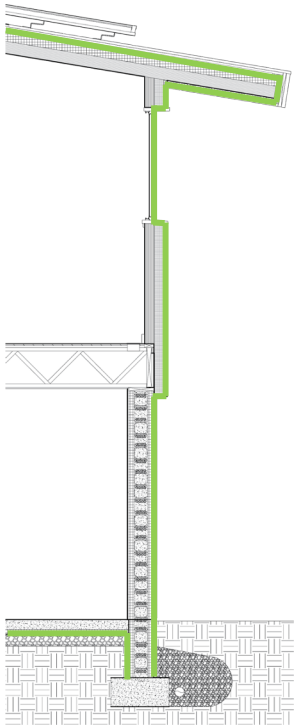




Structure
Control Layers
Continuous Insulation

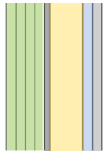


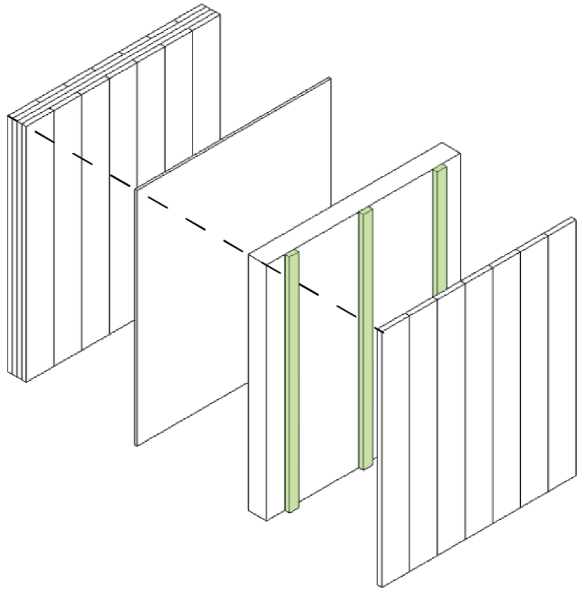


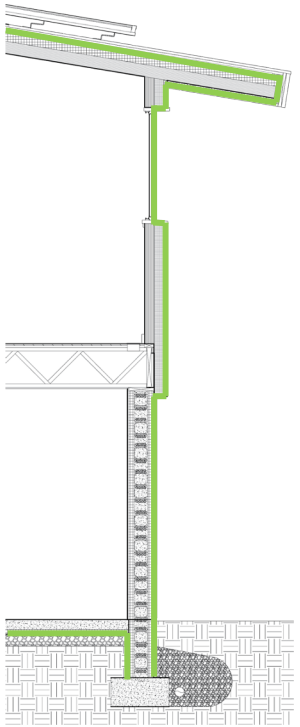


Continuous Insulation

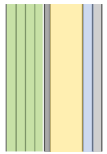
Structure
Control Layers
Continuous Insulation
Air Gap/Drainage

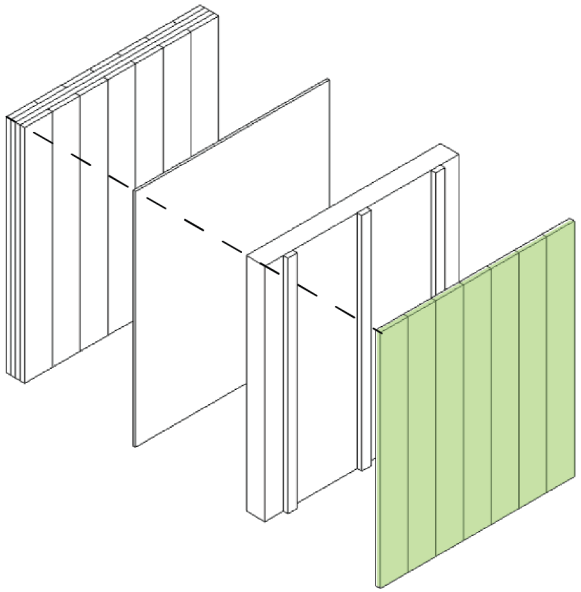


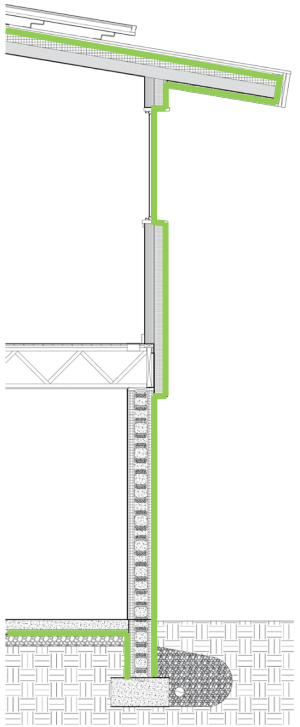


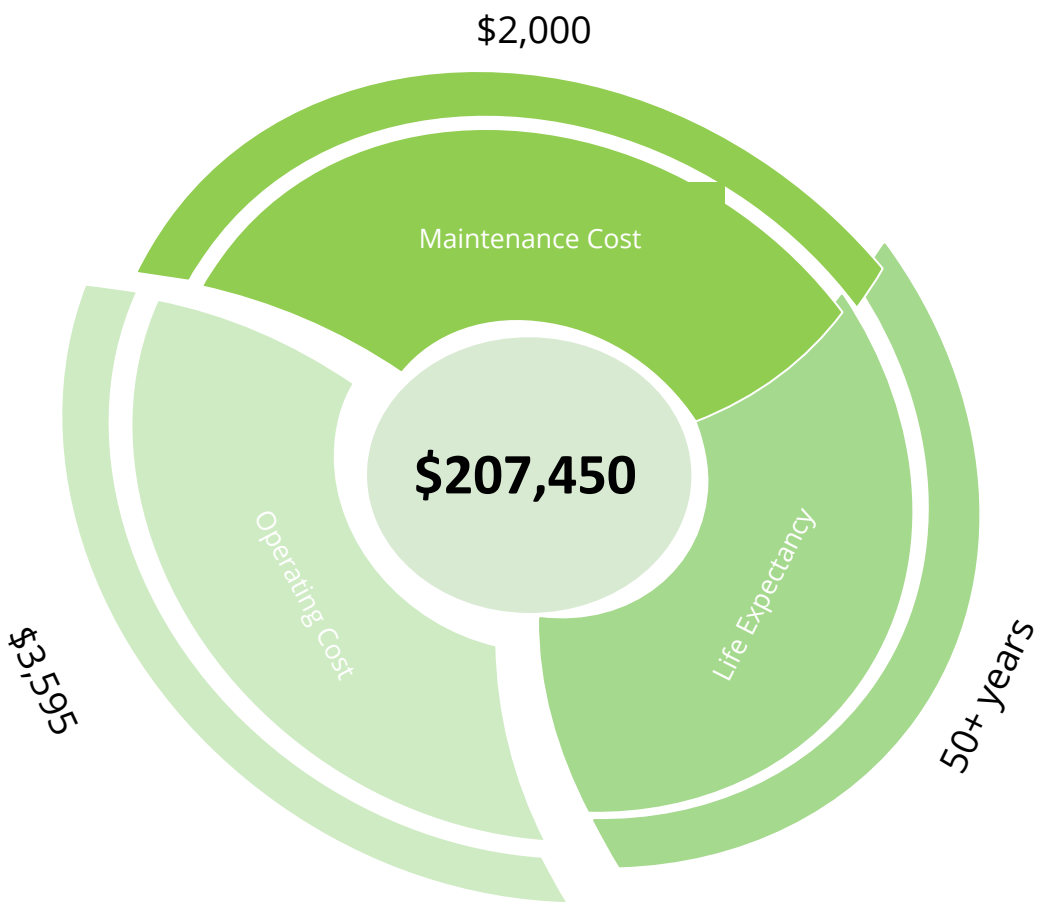


Structure
Control Layers
Continuous Insulation
Air Gap/Drainage
Cladding

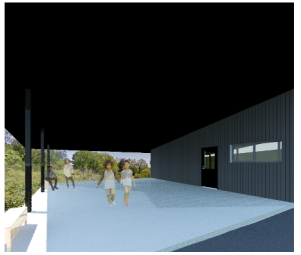




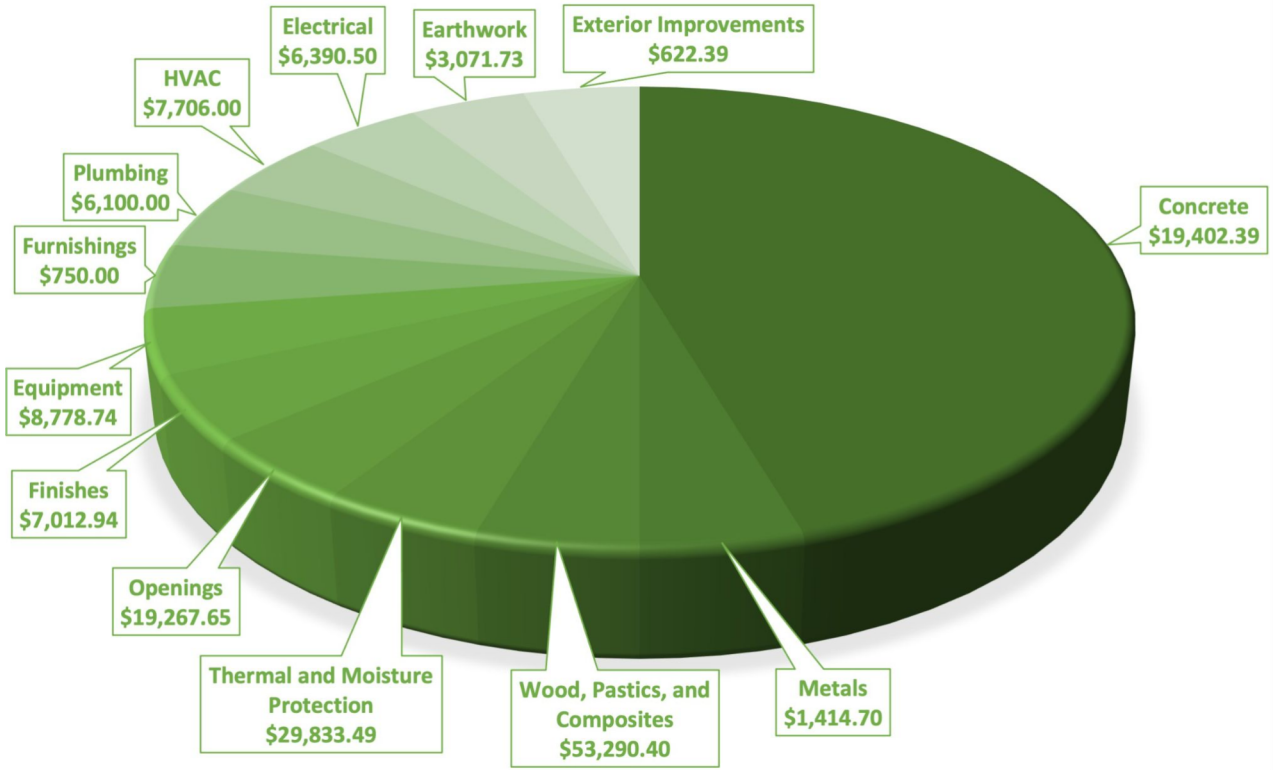




3
Market Analysis

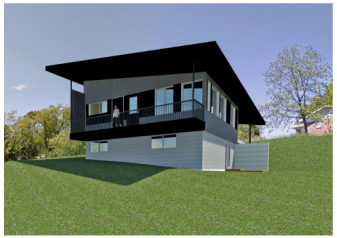


COST ESTIMATE SUMMARY

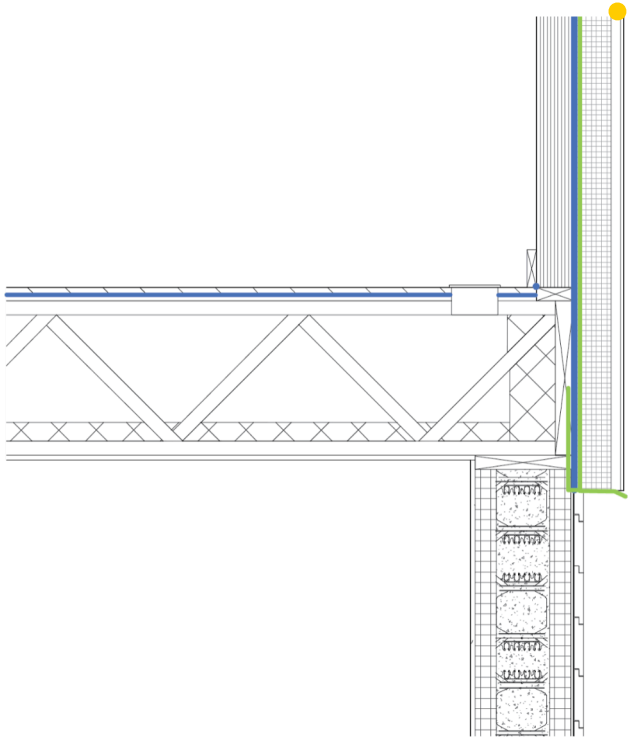


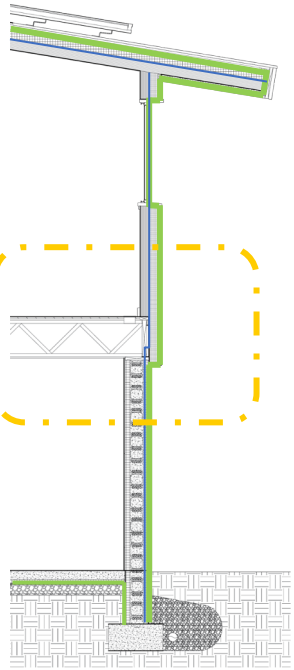
Total Cost of Construction: $207,404.29

2.75% of labor costs saved through Habitat for Humanity "sweat equity"

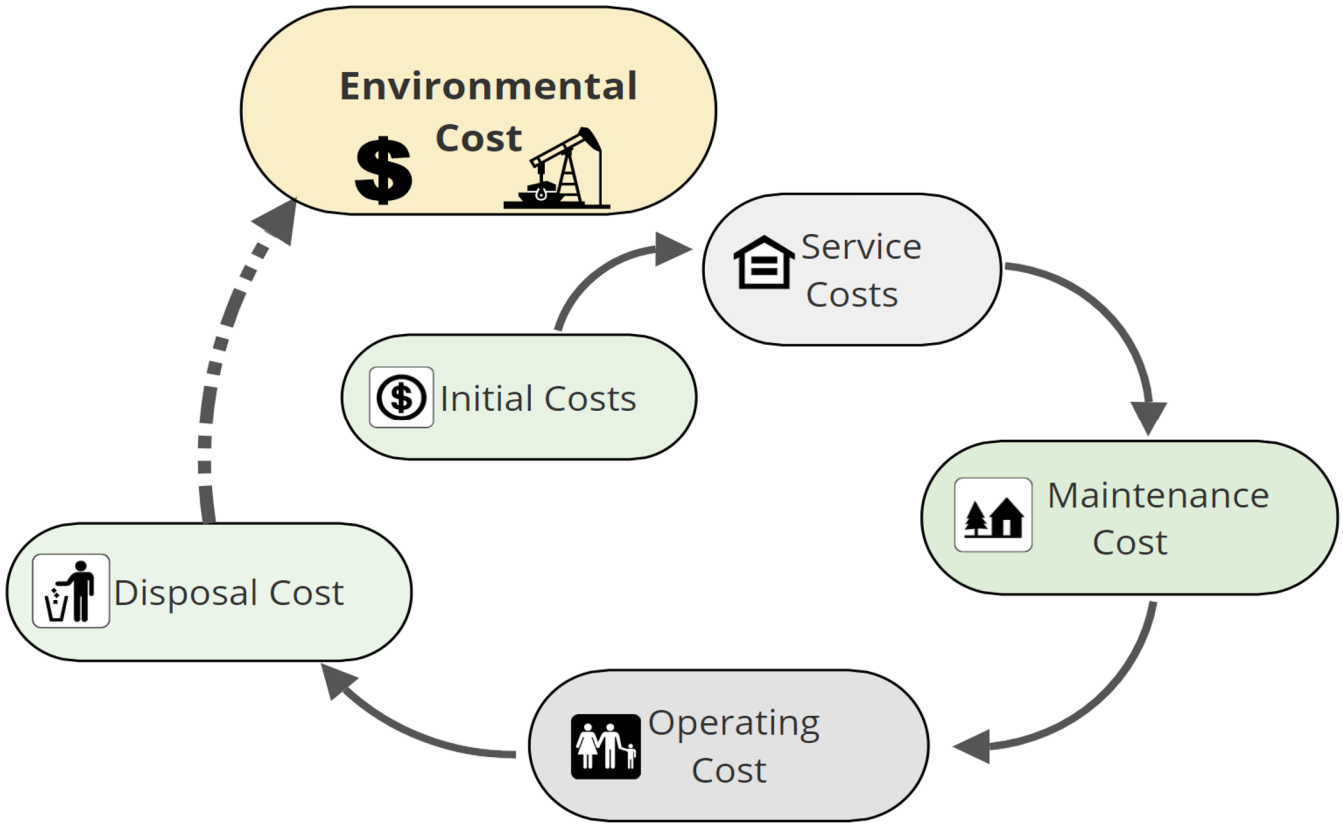


4
Durability and Resilience



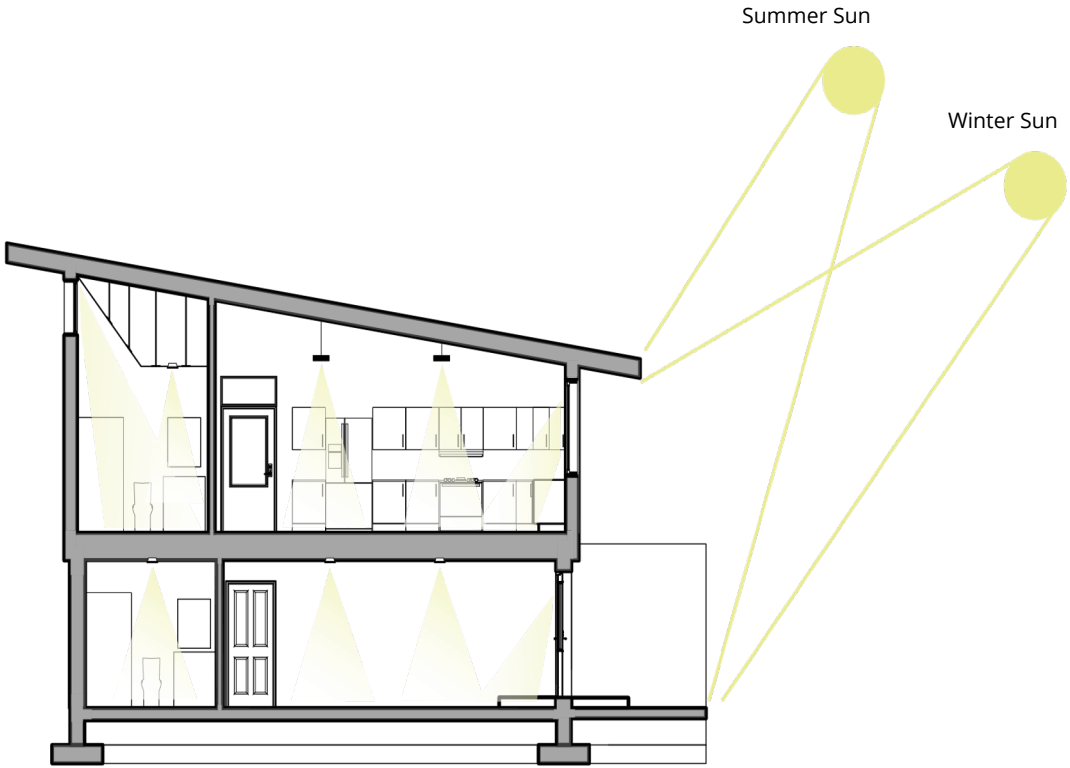


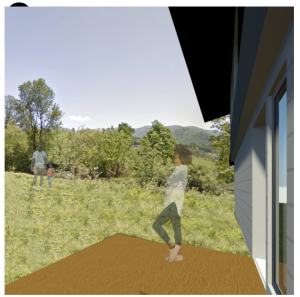
Thermal layer
Moisture layer



5 Embodied Environmental Impact

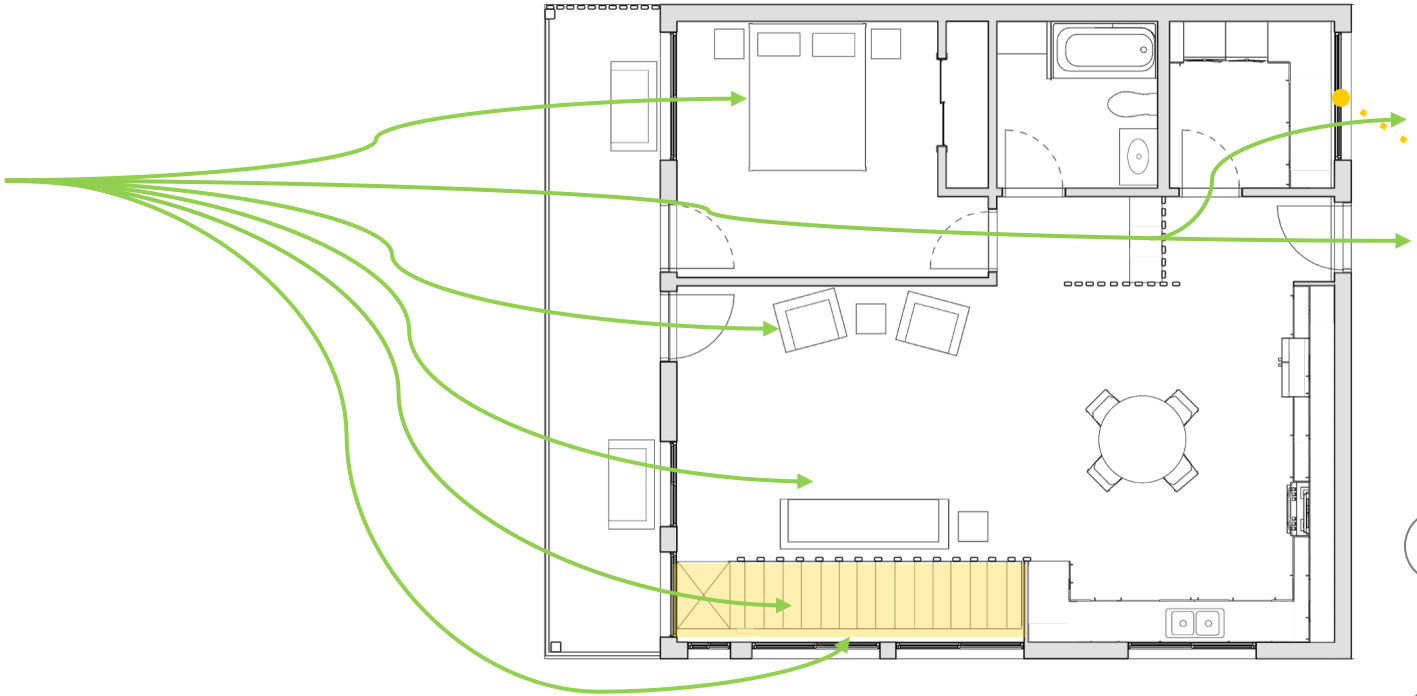
6
Integrated Performanc

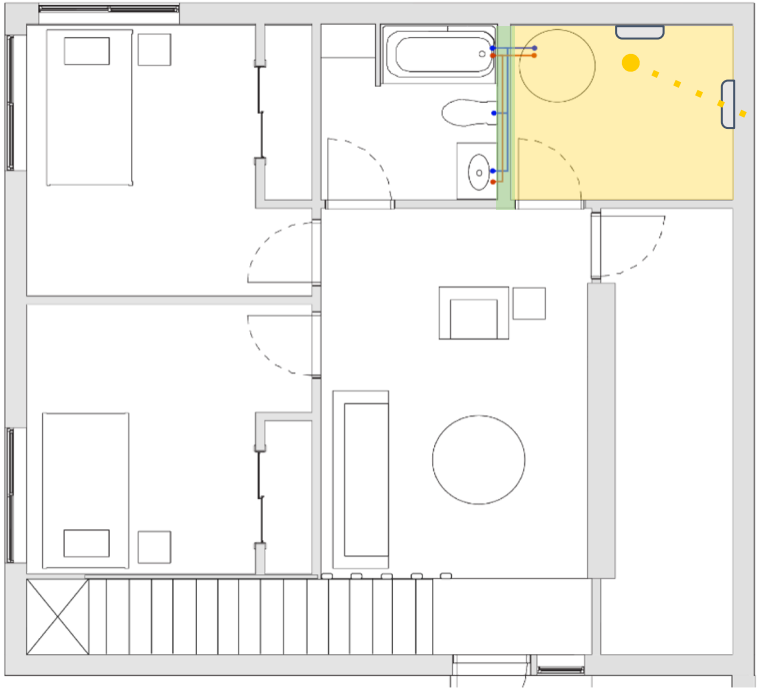


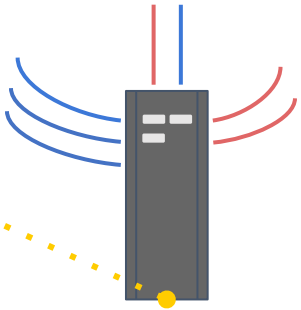


7
Occupant Experience

8
Comfort and Environmental Quality



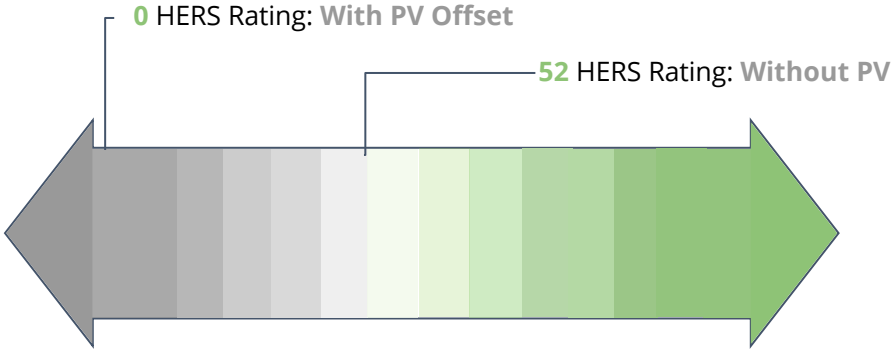





Minimize
Wait-time
Prevent
or Fix
Leaks
Minimize
Travel
Distance
Limit Water
Usage
Minimize
Water
Waste
Excellent
Water
Efficiency
WaterSense
Meets EPA Criteria

9 Energy Performance

HERS Index



LOADS

HEATING	17 kBTU/hr
COOLING	11 kBTU/hr

the
NEW House